[GIG204] COMPUTER ARCHITECTURE IIII

GENERAL INFORMATION

Studies	DEGREE IN COMPUTER ENGINEERING			**Subject**	COMPUTER ENGINEERING
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	OPTIONAL				
Plan	2017	**Modality**	Adapted Face-to-face	**Language**	EUSKARA
Credits	4,5	**Hours/week**	3.75	**Total hours**	67.5 class hours + 45 non-class hours = **112.5 total hours**

PROFESSORS

(No professor appointed)

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
(No specific previous subjects required)	*(No previous knowledge required)*

SKILLS

VERIFICA SKILLS

SPECIFIC

GIE202 - To be able to develop built-in systems and specific processors and to develop and optimise the software for these systems

GIE205 - To be able to analyse, evaluate and select the most suitable hardware and software platforms for supporting built-in and real time applications.

GENERAL

GIGC04 - To be able to define, evaluate and select hardware and software platforms for the development and execution of computer systems, services and applications

GIGC05 - To be able to conceive, develop and maintain computer systems, services and applications, using the software engineering methods in order to ensure quality

GIGC06 - To be able to devise and develop centralised or distributed computer architectures or systems, integrating hardware, software and networks

GIGC08 - To build on basic concepts and technologies to expand knowledge and development of new methods and technologies, and to acquire flexibility to adapt to new situations.

GIGC10 - To know how to perform measurements, calculations, valuations, estimates, inspections, studies, reports, task planning schemes and other analogous related activities

GIGC11 - To be able to analyse and assess the social and environmental impact of technical solutions, understanding the ethical and professional responsibility of the Computer Engineering Technician.

GIGC12 - To understand and apply the fundamentals of economics and human resource management, project planning and organisation, legal and regulatory frameworks and standardisation in computer technology projects

BASIC

G_CB2 - To be able to apply knowledge to occupational or professional tasks; have the necessary skills to pose and defend arguments, and to solve problems within their field of study

G_CB4 - To be able to communicate information, ideas, problems and solutions to both expert and lay audiences

G_CB5 - To have developed learning abilities required to embark on subsequent studies with a high level of autonomy.

LEARNING RESULTS

RGI334 **[!]** ***Conocer la estructura de un microprocesador***

LEARNING ACTIVITIES	*CH*	*NCH*	*TH*
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	2 h.	4 h.	6 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams	4 h.	3 h.	7 h.
Practical work in workshops and/or laboratories, individually and/or in teams	9 h.	7 h.	16 h.

EVALUATION SYSTEM	*W*
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	40%
Individual written and/or oral tests or individual coding/programming tests	60%

Comments: Minimum grade: 5

MAKE-UP MECHANISMS

Written, coding/programming and individual oral tests for the evaluation of technical skills in the field

Comments: Students with less than 5 in the Control point must retake the exam. Control point value will be 25% and retake 75%.

CH - Class hours: 21 h.
NCH - Non-class hours: 14 h.
TH - Total hours: 35 h.

RGI335 **[!]** ***Ser capaz de comprender y desarrollar mapeos y lecturas de memoria y periféricos***

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	,5 h.	1 h.	1,5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	1,5 h.		1,5 h.
Carrying out exercises and solving problems individually and/or in teams	1 h.	,5 h.	1,5 h.
Practical work in workshops and/or laboratories, individually and/or in teams	2,5 h.	1,5 h.	4 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	40%
Individual written and/or oral tests or individual coding/programming tests	60%

Comments: Minimum grade: 5

MAKE-UP MECHANISMS

Written, coding/programming and individual oral tests for the evaluation of technical skills in the field

Comments: Students with less than 5 in the Control point must retake the exam. Control point value will be 25% and retake 75%.

CH - Class hours: 5,5 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 8,5 h.

RGI336 **[!]** ***Ser capaz de comprender y hacer uso de la estructura de microcontroladores actuales***

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	2 h.	4 h.	6 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	7 h.		7 h.
Carrying out exercises and solving problems individually and/or in teams	5 h.	4 h.	9 h.
Practical work in workshops and/or laboratories, individually and/or in teams	11 h.	9 h.	20 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	40%
Individual written and/or oral tests or individual coding/programming tests	60%

Comments: Minimum grade: 5

MAKE-UP MECHANISMS

Written, coding/programming and individual oral tests for the evaluation of technical skills in the field

Comments: Students with less than 5 in the Control point must retake the exam. Control point value will be 25% and retake 75%.

CH - Class hours: 25 h.
NCH - Non-class hours: 17 h.
TH - Total hours: 42 h.

RGI337 **[!]** ***Ser capaz de generar código compatible y portable a diferentes arquitecturas***

LEARNING ACTIVITIES	CH	NCH	TH

Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	2 h.	3 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	4 h.		4 h.
Carrying out exercises and solving problems individually and/or in teams	3 h.	2 h.	5 h.
Practical work in workshops and/or laboratories, individually and/or in teams	7 h.	6 h.	13 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	40%
Individual written and/or oral tests or individual coding/programming tests	60%

Comments: Minimum grade: 5

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Students with less than 5 in the Control point must retake the exam. Control point value will be 25% and retake 75%.

CH - Class hours: 16 h.
NCH - Non-class hours: 11 h.
TH - Total hours: 27 h.

CONTENTS

1. **Memory Structures**
    1. Harvard vs Von Neumann
    2. Caches
    3. Virtual memory
    4. The TLB
    5. MPU and MMU
    6. Memory domains and protections
    7. Example: MMU on a Cortex A9
2. **Multiprocessor systems**
    1. SISD,SIMD,MISD and MIMD models
    2. Caches
    3. Cache coherence and consistency
    4. Coherence protocols
    5. Snooping Control
    6. SCU on the Cortex A9 MPCore
3. **Advanced Exception and Interrupt Systems**
    1. Interrupts and context switches
    2. VIC, NVIC and GIC
    3. Tail chaining
    4. Interrupt nesting (nested interrupts)
    5. Interrupt nesting in GIC (Cortex A9)
    6. ARM GIC architecture
    7. GIC architecture on Zynq Multiprocessors
    8. Software Interrupts
4. **Direct Memory Access (DMA)**
    1. DMA Operation
    2. DMA System in Zynq
5. **Bootloaders and Operating Systems**
    1. Operation of a Bootloader
    2. Bootloaders on multiprocessor systems
    3. The Zynq bootloader system
    4. SMP and AMP systems
    5. Application-to-application AMP systems
    6. Operating systems
        1. Example: The FreeRTOS operating system
        2. Examples: FreeRTOS-Application AMP and FreeRTOS-FreeRTOS
    7. uBoot and Linux
    8. Drivers for operating systems

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_lnk.pl?grupo=INFORMATICA32&ejecuta=25&
Labs	

Moodle Platform
Specific Master Software